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16. INDUCED BREEDING OF MAJOR CARPS IN GUJARAT STATE WITH A NOTE ON SPAWNING OF CARPS IN BOKH RESERVOIR, PRANTIJ

The area of water available in Gujarat State for pisciculture amounts to about 5000 hectares, but only 2000 hectares are being utilised for fish culture and the State requires about 7.6 million fry for stocking them as against the present production of only 1.6 million, the bulk of which is obtained from rivers (Anon. 1966). The State used to import large quantities of fry from West Bengal involving expenditure, for instance of Rs. 2550 for 0.26 million fish seed from Calcutta in 1961 (Anon. 1966).

Since the success of induced breeding of carps in India (Chaudhuri & Alikunhi 1957) and development of this technique (Chaudhuri 1960; Alikunhi *et al* 1960; Chaudhuri 1954) the technique has been successfully applied for production of quality fish seed on a commercial scale in several States and in Gujarat since 1962, the production of fish seed has gone up in succeeding years by the application of this method (Anon. 1966). An account of the induced breeding experiment in 1962 in the State for the first time and a note on the natural spawning of carps in Bokh reservoir, Prantij, are presented here.

An extensive survey conducted in 1962 showed that carps bred in Bokh reservoir, Prantij, connected with the Hatmati River. During monsoon, this reservoir receives rain water from an extensive catchment area and also from the Hatmati River. The ecological conditions are generally comparable to those of the wet type of bundhs described by Alikunhi *et al* (1964) around Nowgong, Madhya Pradesh.

Spawning of minor carps and other small fishes was observed throughout day and night on 13 July 1962 with inundation of the

shallow margins by heavy rain. Active spawning of Rohu and Mrigal commenced on the night of 13 July, 1962, when water was let in from the river. Chasing of females by males and mating was seen in very shallow waters. Sometimes fishes were observed even rubbing against persons standing at such places and ejecting eggs in the process. Fishermen could catch fishes easily during spawning with cast nets. It is interesting to note that the fish were not scared by the movement caused by people wading through water though Alikunhi *et al* (1964) observed that 'sudden movement of water scared the fishes away, which return to spawning ground within a few minutes'.

Spawning behaviour of the fish in this reservoir is more or less similar to those described by Dubey & Tuli (1961) and Alikunhi *et al* (1964). Difficulties encountered in collection of fish seed from the natural spawning ground were simultaneous breeding of minor carps and other fish, poor arrangements for hatching of eggs, predation of eggs and hatchlings by insects. Further, the eggs collected from the breeding ground were in various stages of development involving difficulties in hatching them together.

There is an abundant stock of major carps, mainly Rohu in the reservoir. Attempts to breed them by pituitary injections were initiated from 6th July and experiments were carried on till 12th August. 14 sets of Rohu and 4 sets of Mrigals were injected during this period. Details of experiments are presented in the table.

TABLE
DETAILS OF EXPERIMENTS ON INDUCED BREEDING

Particulars	<i>Labeo rohita</i>	<i>Cirrhina mrigala</i>
1. No. of sets injected	14	4
2. Weight of breeders (range)	♀ 2·00-4·5 kg. ♂ 2·00-4·00 kg.	2·5-3·5 kg. 2·0-4·0 kg.
3. No. spawned	5	1
4. Dose (range) { I	2·0-2·5 mg./kg. body wt.	2·5 mg./kg.
II	6 mg./kg.	not given.
5. Dose (range) when spawning obtained	2·5 kg.-6 mg.	2·5 mg.
6. Fertilisation (range)	82·00-94·00%	63%
7. Water temperature (range)	28·8°-32·2°C	28·8°-32·0°C
8. Spawn obtained	1,90,000	Nil

In all experiments breeders were collected either by gill net or by cast nets. Collection and stocking of breeders well in advance of

breeding season was not possible due to lack of suitable stocking ponds and hence the fishes were collected only 12 hours prior to injection. They were either kept in hand nets or in condition *hapas* till the time of injection.

Glands were collected from fully ripe Rohu, Mrigal and Catla. In most cases freshly collected glands were used for injection and in a few cases glands preserved in absolute alcohol for 3 days without refrigeration were used.

Breeding *hapas* were fixed in reservoir where there was a slight flow of water. High atmospheric temperature, normally 40°C prevailed during such periods and hence injection was given only on comparatively cooler days when water temperature was between 28.8°-32.2°C, mainly during rainy days.

Spawning occurred 4-10 hours after injection. Percentage fertilisation was between 63-94 except in one case where fertilisation was poor. Eggs hatched out 14-18 hours after fertilisation.

Out of 18 sets injected, only 6 gave successful results. In some cases where the *hapas* were fixed in areas covered with lotus, the eggs were found to be decomposed and it was noticed that vegetation near these *hapas* was decomposing which probably was a contributory cause. From these experiments 1,90,000 hatchlings were obtained.

In many of the successful cases, fish responded to one injection at a lower dose of even 2.5 mg./kg. body weight of the recipients. In pond-reared fishes, an initial low dose of 2-3 mg./kg. body weight and after about 6 hours an effective dose of 5-8 mg./kg. body weight for females are reported to give successful results (Chaudhuri 1966). However, from the present observation, it appears that fishes collected from natural spawning ground require comparatively lower dose as they are in prime condition. Even stripping and artificial fertilisation of fishes collected from natural breeding grounds can be attempted for the production of fish seed, wherever possible so that the use of pituitary material can be avoided.

Fish seed requirements of Gujarat State had been calculated to be 100 million, 50 million and 15 million in terms of spawn, fry and fingerlings respectively, while the present production of fish seed is too inadequate when the State proposes to bring an additional water area of 4000 hectares under fish culture during the fourth plan. The bulk of the production is restricted to river collection which is reported to contain 80% economic species (Anon. 1964). Obvious limitations of river collection such as dependence on several ecological and meteorological factors as also the uncertainty of the quality of

fish seed collected, necessitates intensification of induced breeding methods in the State.

The present experiments on breeding of major carps were the first undertaken in Gujarat State. Inadequate facilities like lack of ponds and trained personnel were responsible for the limited success. However, the success achieved indicated that there was ample scope for developing Bokh reservoir as a major fish seed production centre in the State.

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CENTRAL INLAND FISHERIES

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G. C. PANICKER

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17. THE GIANT AFRICAN LAND SNAIL *ACHATINA FULICA* BOWDICH IN BIHAR

The Giant African Land Snail *Achatina fulica*, a native of East Africa, is now widely distributed in all tropical and subtropical countries. In India it has been reported from Bengal (Hornell 1951), Orissa (Behura 1955), Kerala and Andaman-Nicobar Islands.

The snail, is a serious pest of garden crops, vegetables, rubber, tea